CLAIMS

1. A matching network for coupling an RF power supply to an RF antenna in a plasma generator, comprising:

a resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration;

a ferrite core transformer coupled to the resonantly tunable circuit.

2. The matching network of Claim 1 wherein the transformer comprises a secondary winding which couples the transformer to the tunable circuit and a primary winding.

3. The matching network of Claim 2 wherein the secondary winding is a single-turn winding and the primary winding is a multi-turn winding.

4. The matching network of Claim 3 wherein the transformer further comprises a core which is made of a plurality of ferrite cores.

5. The matching network of Claim 2 wherein the transformer further comprises a core which is made of a plurality of ferrite cores.

6. The matching network of Claim 2 wherein the turn ratio between the primary winding and the secondary winding ranges from 3:1 to 8:1.

7. The matching network of Claim 6 wherein the turn ratio between the primary winding and the secondary winding is selected to transform the plasma impedance of the plasma generator to 50Ω.

8. The matching network of Claim 6 wherein the transformer comprises a core made of 12 ferrite cores with a 1.25 inch OD and 0.75 inch ID, made of M-type ferrite.

9. The matching network of Claim 8 wherein the variable capacitor has a capacity range of 5-125pF.

10. The matching network of Claim 9 wherein the network fits within a cylindrical volume 6 inches in diameter and 8 inches long.

11. The matching network of Claim 1 further comprising an RF power supply connected through a 50Ω coaxial cable to an input of the matching network and an RF antenna (inductive coil) connected to an output of the matching network.

12. A plasma ion or electron source, comprising:

an RF power supply;

a coaxial cable connected to the RF power supply;

a matching network having an input connected to the coaxial cable, the matching network comprising:

a resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration;

a ferrite core transformer coupled to the resonantly tunable circuit;

an RF antenna connected to an output of the matching network;

a plasma ion or electron generator having the RF antenna mounted therein for inductively generating a plasma.

13. The plasma ion or electron source of Claim 12 wherein the transformer comprises a secondary winding which couples the transformer to the tunable circuit and a primary winding.

14. The plasma ion or electron source of Claim 13 wherein the secondary winding is a single-turn winding and the primary winding is a multi-turn winding.

15. The plasma ion or electron source of Claim 14 wherein the transformer further comprises a core which is made of a plurality of ferrite cores.

16. The plasma ion or electron source of Claim 14 wherein the turn ratio between the primary winding and the secondary winding ranges from 3:1 to 8:1

17. The plasma ion or electron source of Claim 14 wherein the coaxial cable has an impedance of 50Ω and the turn ratio between the primary winding and the secondary winding is selected to transform the plasma impedance of the plasma generator to 50Ω.

18. The plasma ion or electron source of Claim 12 wherein the plasma ion or electron generator is a multicusp plasma generator.

19. The plasma ion or electron source of Claim 18 wherein the source is a part of a compact focused ion beam system.

20. The plasma ion or electron source of Claim 19 wherein the matching network fits within a cylindrical cavity 6 inches in diameter and 8 inches long.